(No Model.) 4 Sheets—Sheet 1.

M. G. CRANE & F. W. COLE.

VISUAL INDICATOR FOR FIRE ALARM AND OTHER PURPOSES.

No. 452,165. Patented May 12, 1891.

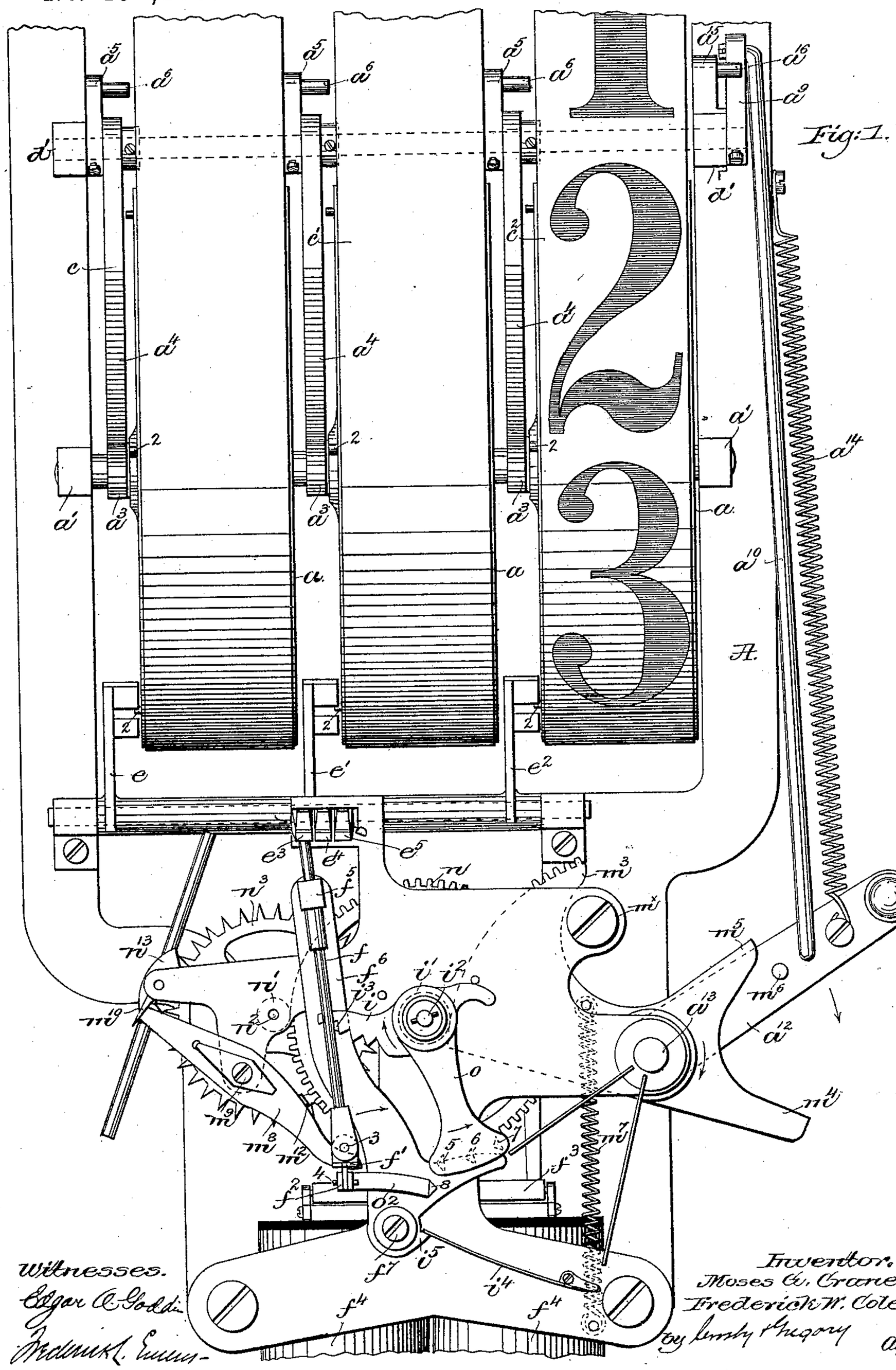

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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VISUAL INDICATOR FOR FIRE ALARM AND OTHER PURPOSES.

No. 452,165. Patented May 12, 1891.

Fig: 2.

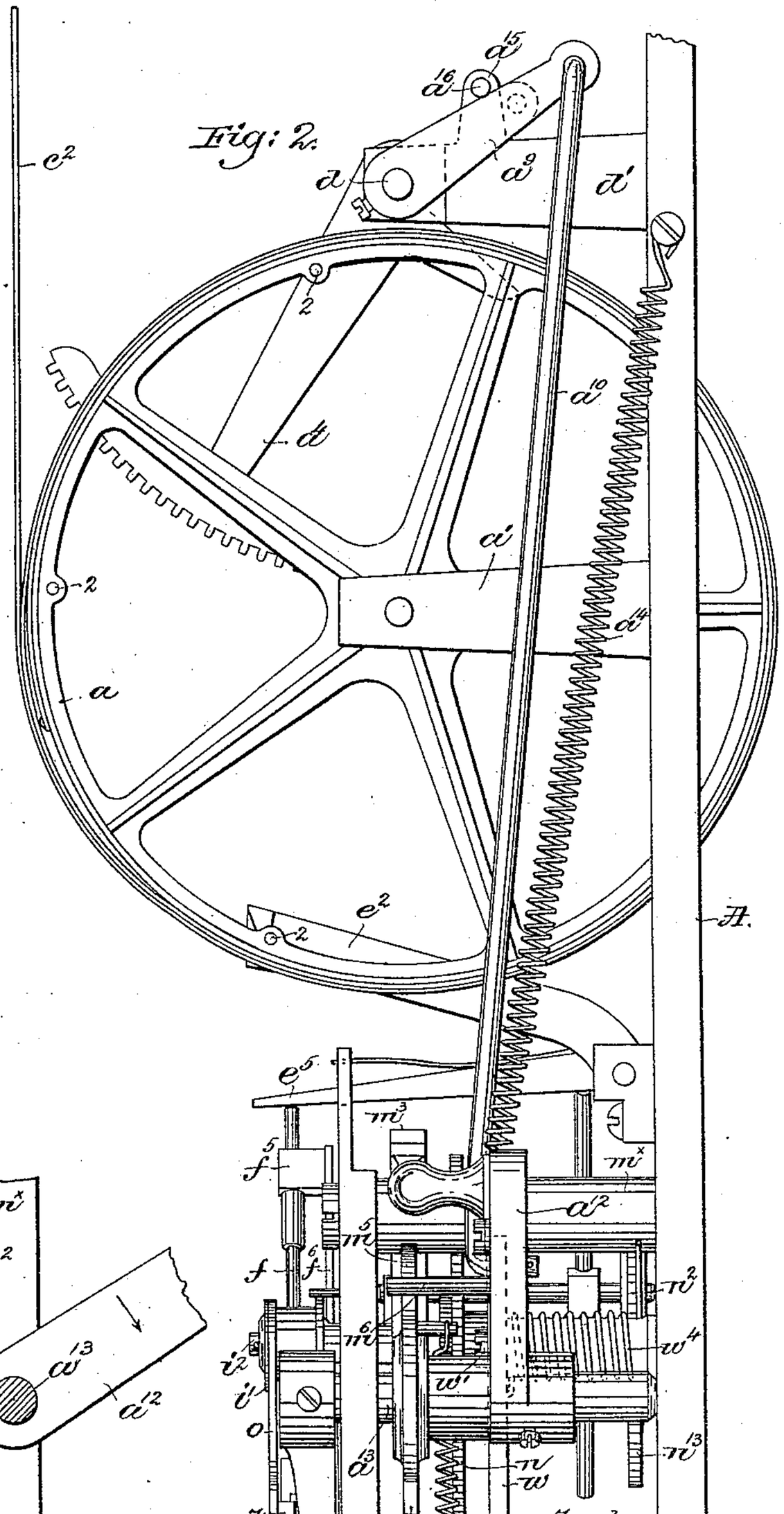
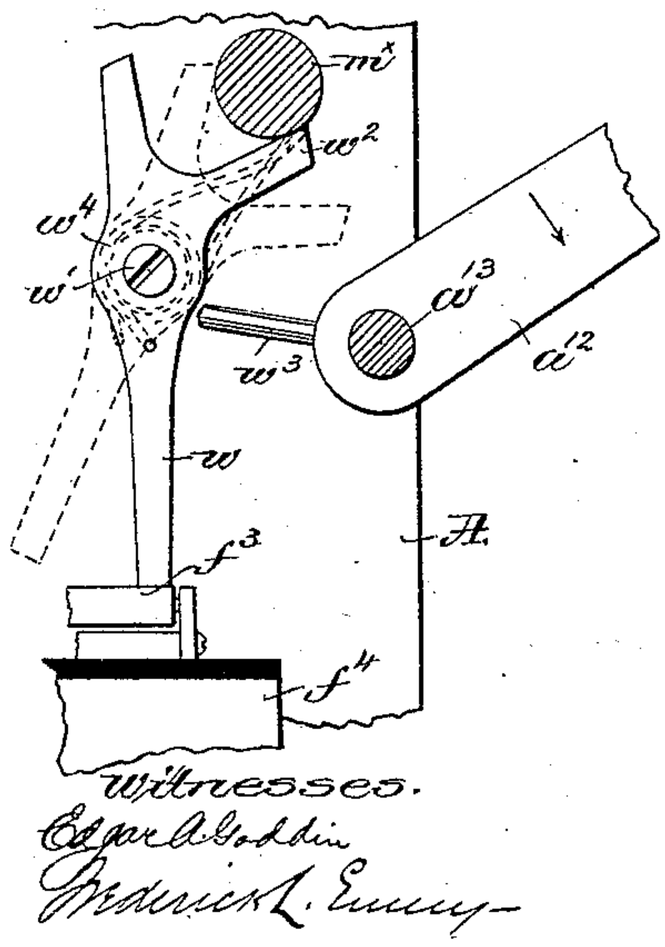


Fig: 5.



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(No Model.) 4 Sheets—Sheet 3.

M. G. CRANE & F. W. COLE.

VISUAL INDICATOR FOR FIRE ALARM AND OTHER PURPOSES.

No. 452,165. Patented May 12, 1891.

Fig. 3.

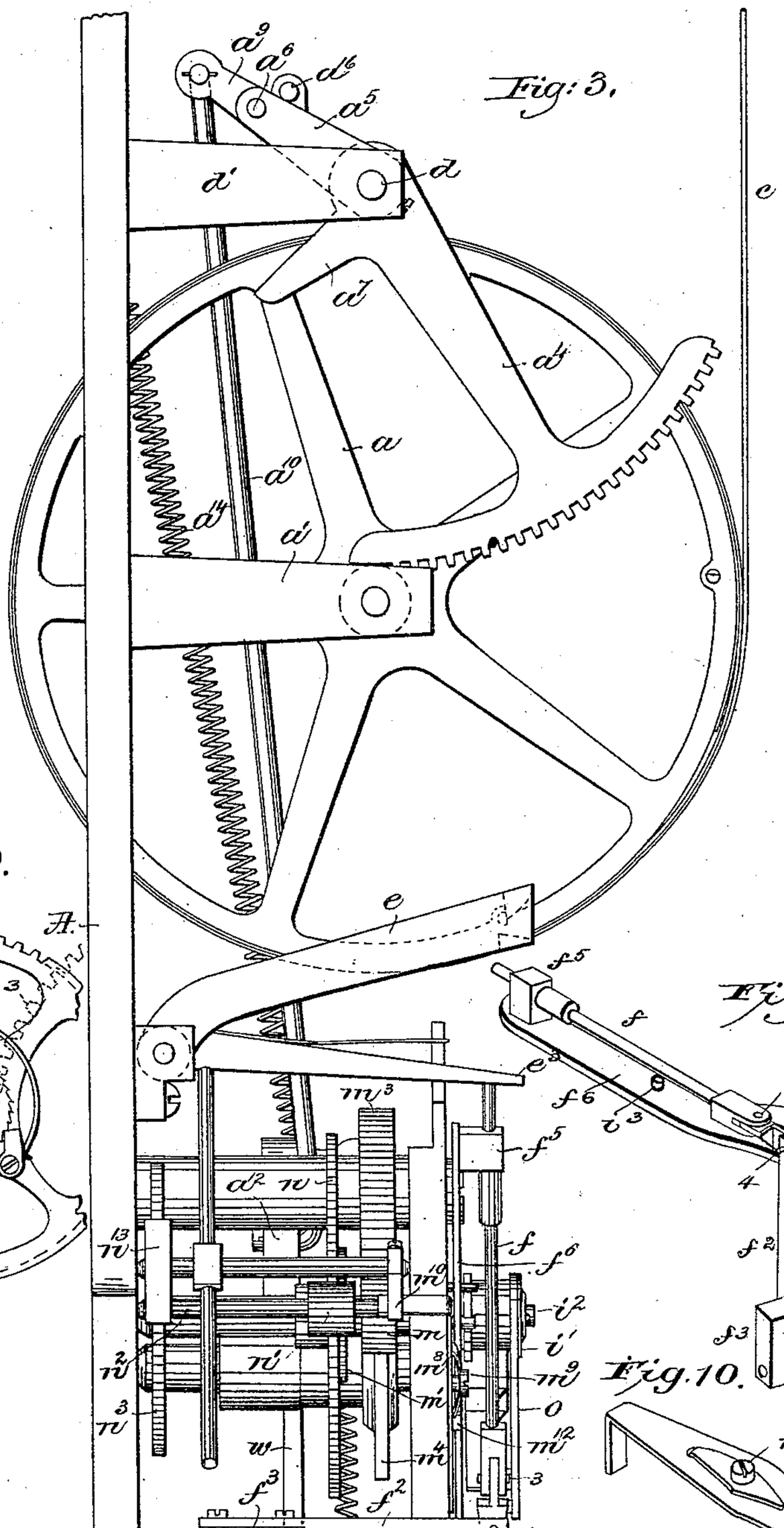


Fig. 9.

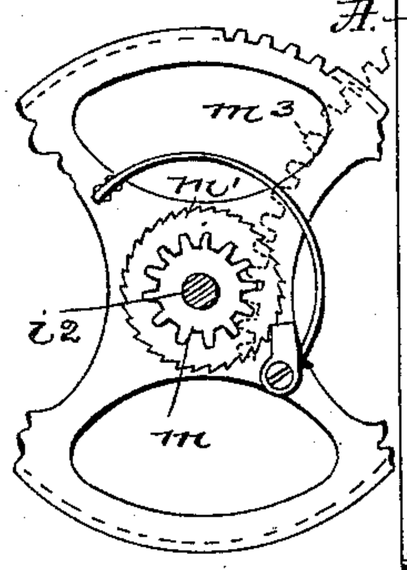


Fig. 8.

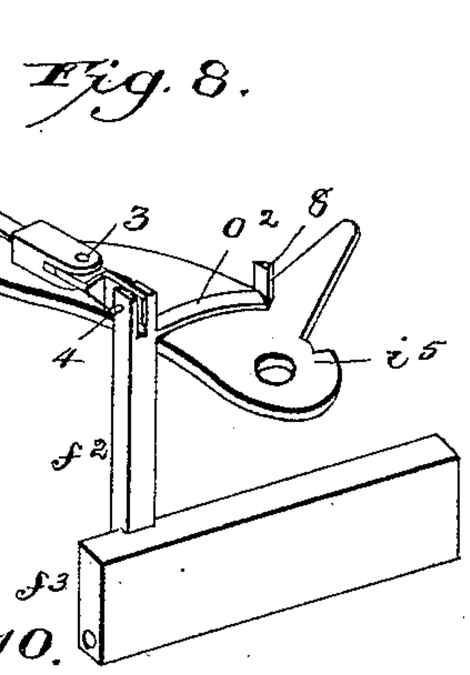
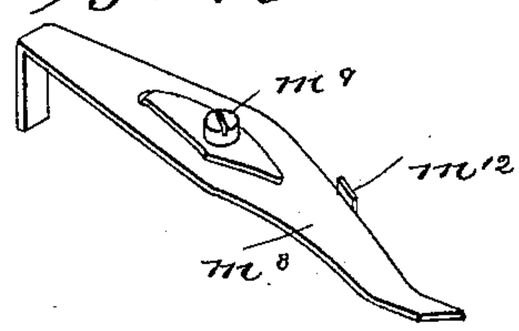


Fig. 10.



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(No Model.) 4 Sheets—Sheet 4.

M. G. CRANE & F. W. COLE.

VISUAL INDICATOR FOR FIRE ALARM AND OTHER PURPOSES.

No. 452,165. Patented May 12, 1891.

Fig: 4.

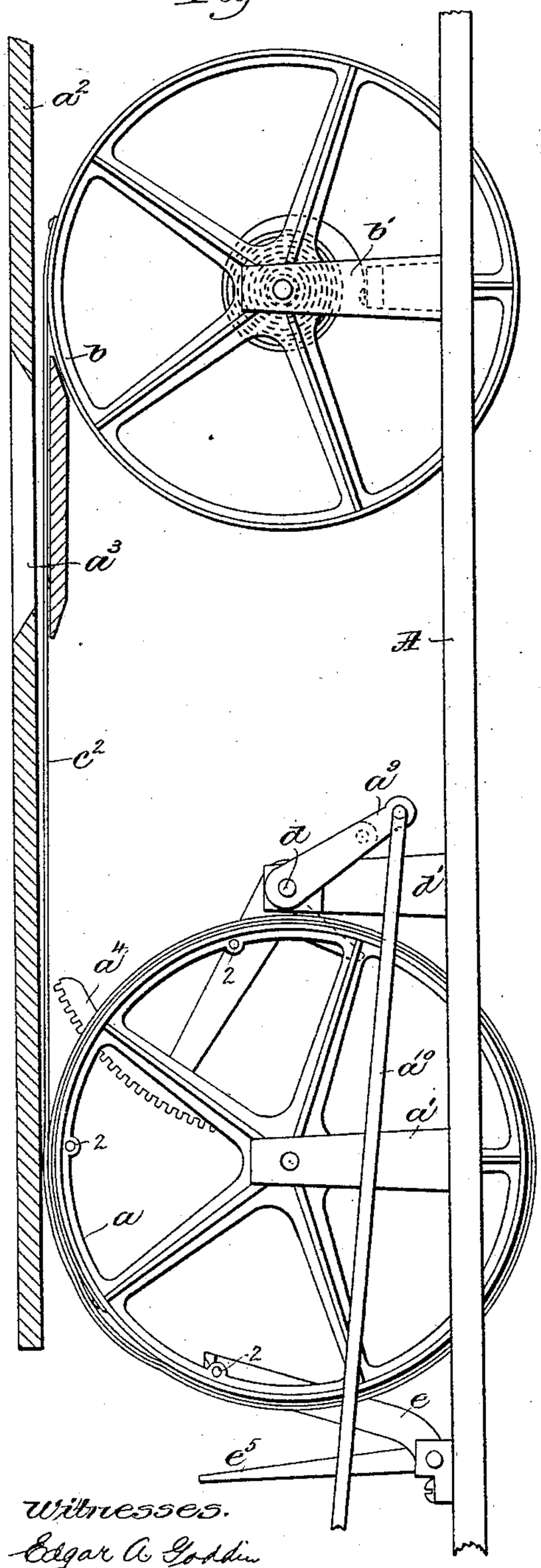


Fig: 6.

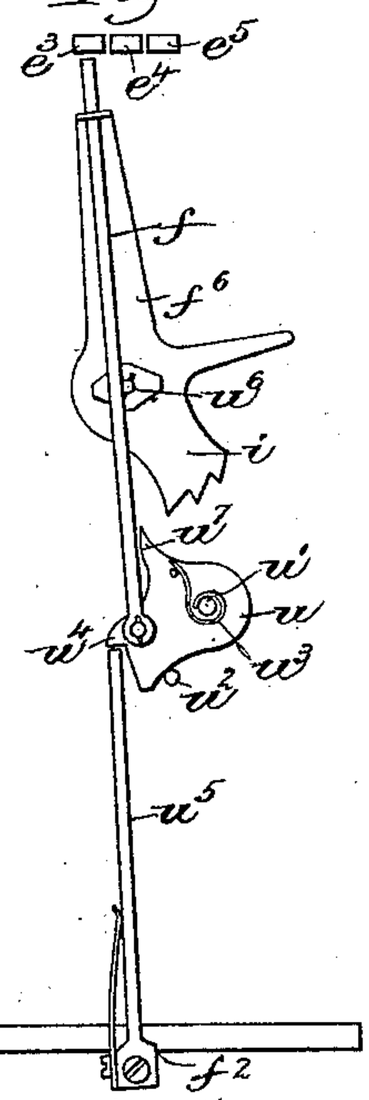
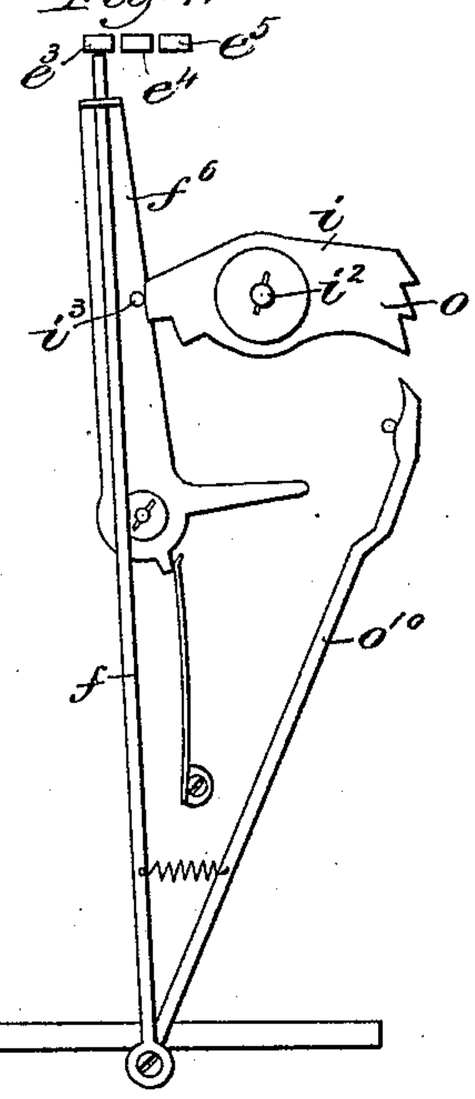


Fig: 7.



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UNITED STATES PATENT OFFICE.

MOSES G. CRANE AND FREDERICK W. COLE, OF NEWTON, MASSACHUSETTS

VISUAL INDICATOR FOR FIRE-ALARM AND OTHER PURPOSES.

SPECIFICATION forming part of Letters Patent No. 452,165, dated May 12, 1891.

Application filed March 7, 1890. Serial No. 342,963. (No model.)

To all whom it may concern:

Be it known that we, MOSES G. CRANE and FREDERICK W. COLE, both of Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in Visual Indicators for Fire-Alarm and other Purposes, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to improve the construction of electric indicators for fire-alarm and other purposes.

In electric systems for sounding alarms for fire and other purposes by numbered strokes of bells or gongs it is desirable that the operatives of the police or fire department on duty at the various stations may ascertain the alarm given at the earliest moment and independent of the sound of the bell or gong. To accomplish this end various devices have been patented to register or record the number of the alarm sounded in such a manner as to place the number of the alarm in plain view and sight of the operatives without care on their part. Such devices have employed two or more wheels placed side by side, with the numbers from 1 to 9 on their peripheries, in combination with mechanism actuated by the alarm mechanism to rotate the wheels step by step independently until the desired combination of numbers has been brought into line before an opening in the case of the apparatus. With all such apparatus, however, the wheels must be of comparatively small diameter in order to be operated by the delicate mechanism, and the numbers on the peripheries of the wheels must be correspondingly reduced in size, thus making the reading of the numbers indicating the alarm difficult unless the operatives be very near the same. In accordance with this invention it is desired that the figures shall be made as large as possible, and hence they are arranged on bands or tapes attached at the ends to the wheels or drums or other movable frames, which are moved intermittingly and independently either directly or indirectly. The figures when displayed are on the substantially plane surface of the tapes intermediate the wheels or movable frames, thus making it possible to display very large figures without making the frames of greater diameter than the figured wheels now in use. Springs or equivalents may be employed to move the wheels or drums when released, or said wheels may be positively moved. Let-offs or equivalents are employed to release or move the said wheels or drums, one let-off for each wheel or drum. An operating-bar is employed to move the said let-off, the position of which is governed by a stepped plate, and said operating-bar is itself moved by an electro-magnet. The stepped plate is moved in one direction by a time-train or motor mechanism; but its connection therewith is such that it may be moved in the opposite direction or restored to its normal position independently of the movement of the said train. Means are provided for winding the motor mechanism or time-train, and also for restoring the parts to their normal position.

Figure 1 represents in plan view an electric indicator embodying this invention, the upper and lower portion thereof being removed; Fig. 2, a right-hand side elevation of the electric indicator as shown in Fig. 1; Fig. 3, a left-hand side view of the indicator shown in Fig. 1; Fig. 4, a side view of the mechanism for moving the figured band or tape, the same being the upper portion removed from Fig. 1; Fig. 5, a detail to be referred to, and Figs. 6 and 7 modifications to be referred to. Figs. 8, 9, and 10 are details to be referred to.

The main frame-work A is of suitable construction to support the operating parts. The wheels or drums a, preferably three in number, are arranged loosely on a rod or shaft mounted in the posts or standards a'. Wheels or drums b, also preferably three in number, are arranged on a rod or shaft mounted in posts or standards b', said wheels b being arranged directly above and in parallelism with the wheels a. Bands or tapes are supported on the wheels, there being three bands or tapes, as c c' c^2, employed. Figures are painted, embossed, or otherwise placed on the tapes or bands c c' c^2; but in the drawings only one band, as c^2, is shown as numbered. Said tapes or bands and the mechanism for moving them independently are inclosed by

a case a^2, having at one portion openings, as at a^3, to expose a portion of the substantially plane surface of said tapes or bands, so that one figure alone of each tape or band may be exposed at a time.

Springs are employed for moving the wheels, and consequently the bands or tapes, one spring being provided for each band or tape, and is here shown as arranged in connection with the wheels by one end of each spring being attached to the hub of each wheel and the other end to posts or standards on the main frame-work, so that as the said wheels are turned in one direction the springs are wound up, which, when released, will move the wheels b in the opposite direction. The winding mechanism is herein shown as connected to the wheels a, although it is obvious that it may be connected with the wheels b, and, while a particular construction is shown and will now be described, we do not desire to limit our invention to such construction.

On or secured to the hub of each wheel a is a pinion a^3, and on a shaft d, mounted in posts or uprights d' on the main frame, are loosely arranged three sectors a^4, which mesh with the pinions a^3. On the shaft d are rigidly secured several arms a^5, one of which is arranged beside each sector a^4 and one a^9 at the end of the shaft. Each arm a^5 has a pin a^6, which, when the shaft is rotated, strikes the upper side of a projection a^7, formed on each sector a^4, raising the sector, and thereby rotating the wheels a in one direction. The arm a^9 is fixed to the shaft, which is connected by a link or connecting-rod a^{10} with a winding-arm a^{12}, pivoted at a^{13}, movement of the winding-arm on its pivot in the direction of the arrow, Fig. 1, turning the shaft to raise the sectors and rotate the drums a, while a spiral spring a^{14}, one end of which is connected with the winding-arm and the other end to the frame-work, serves to restore the winding-arm to its normal position, and thereby return the shaft to its normal position. The pin a^{16} on an arm a^{15} of the post d' serves as a stop-pin for the arm a^9 to limit the backward movement of the shaft. It will be seen that as the drums a are rotated by the winding mechanism shown and described the wheels b are simultaneously rotated in connection with the wheels a by the tapes or bands c c' c^2, thereby winding the springs on the wheels b, which in recoiling rotate the wheels b, and consequently the wheels a, in the opposite direction. Studs 2 are formed on the rims of the wheels a, or, of course, it may be on the rims of the wheels b, with which co-operate independent let-offs for each wheel or drum, said let-offs each comprising two arms, one of which, as e e' e^2, co-operates with the studs 2, and the other of which e^3 e^4 e^5 are located adjacent to each other to be acted upon by a suitable operating bar or lever. This construction of the let-off is substantially the same as shown and described in an application, Serial No. 342,950, filed concurrently with this by Mr. F. W. Cole; also, there will be found in said application many of the parts herein employed.

An operating-bar f (see Figs. 1, 2, and 8) is pivoted at 3 to a frame f', which is in turn pivoted at 4 to the armature-carrying lever f^2, supporting the armature f^3 of an electro-magnet f^4. This bar f is moved toward and from one or another arm e^3, e^4, or e^5 of the let-offs to move them, and is guided in a block f^5, secured to a plate f^6, pivoted at f^7 to the frame-work. The plate f^6 serves as the directing-plate to position the bar f, determining with which arm e^3 or e^4 or e^5 it shall act.

A stepped plate i is secured to a collar i', held frictionally on a shaft i^2. A stud i^3 on the plate f^6 bears against the stepped portion of the said plate i firmly by means of a flat spring i^4, the outer or free end of which bears against a projection i^5 on the plate f^6. A toothed wheel n is secured to the shaft or arbor i^2, which meshes with a pinion n' (see dotted lines, Fig. 1) on a shaft or arbor n^2. An escape-wheel n^3 is secured to said shaft or arbor n^2, with which co-operates a suitable pallet n^{13}. A pinion m is arranged loosely on the shaft or arbor i^2, which has secured to it a ratchet-wheel m', (see Figs. 3 and 9,) which co-operates with a pawl carried by the toothed wheel n. A toothed sector m^3, pivoted at a^{13}, engages the said pinion m, and said sector has two arms or projections m^4 m^5. A stud m^6 is arranged on the winding-arm a^{12}, which as the arm is turned on its pivot to wind the wheels a strikes the arm or projection m^4 and turns the sector m^3 in the direction of the arrow thereon, thereby rotating the pinion m and ratchet-wheel in a direction to permit the pawl to slip loosely over the teeth of the ratchet. A spiral spring m^7 is connected at one end to the main frame and at the other end to the sector m^3, the tendency of which is to move the sector in the direction opposite to the arrow thereon, thereby rotating the pinion m in the opposite direction that the ratchet-wheel may engage the pawl and drive the train. The arm m^5 serves to limit the movement of the sector m^3 in one direction by striking the post $m^\times$ of the frame-work.

A lever m^8 is pivoted at m^9 to the frame, one end of which co-operates with a detent m^{10} on the shaft which carries the pallet n^{13}, and the other end of which has a projection m^{12}, (shown in Figs. 1, 3, and 10,) which is struck by the plate f^6 when the latter is turned on its pivot in the direction opposite to that of the arrow thereon. This lever m^8 is held on its stud by friction, so that it remains in whatever position it may be placed. The outer end of the lever m^8 terminates just in front or above the armature-carrying lever f^2, (see Figs. 1 and 3,) so that as the latter is retracted it moves the lever m^8 on its pivot in one direction to disengage the detent m^{10} and release the train, said train when once released

running down until the arm m^5 of the sector m^3 engages the post $m^\times$ or the lever m^8 is restored to its normal position.

It is the intention to operate the bar f successively to move the arm e^3, and then after a short period of rest to move the arm e^4 successively, and then after a period of rest to move the arm e^5 successively, and thereafter by means of the winder the bar f and all the co-operating parts may be restored to their normal position. To effect this movement between the successive impulses the stepped plate i is moved back to its normal position at each time the armature is attracted or retracted and is moved forward by the continuously-revolving shaft i^2 whenever the motor mechanism is released. To effect this result a plate o is secured to the collar i', which carries the stepped plate i, said plate o having on its under side three studs 5 6 7, beveled in opposite directions, as best shown in Fig. 1, and an arm o^2 is secured to the armature-carrying lever, which has at its outer end a vertical stud 8, beveled in opposite directions, as shown, said stud 8 co-operating with one or another stud 5 6 7. On the occurrence of the first impulse the armature is retracted, moving the arm m^8, and thereby releasing the time-train and setting the shaft i^2 revolving, thereby moving the stepped plate i on it as a pivot in direction of arrow. As the armature is retracted the stud 8 strikes the beveled face of the stud 5 and moves the plate o in the direction of the arrow thereon, thereby restoring the plate i to its normal position. As the armature is attracted the stud 8 strikes the opposite beveled face of the stud 5 and again moves the stepped plate i back to its normal position. This operation is repeated while the impulses succeed each other with rapidity; but as soon as there is a cessation or interval of time of long duration between a succession of impulses the plate i is moved until the next step thereof co-operates with the stud i^3 on the plate f^6, thereby permitting the plate f^6 to swing on its pivot in the direction of the arrow thereon and direct the operating-bar f to the next arm e^4. On the occurrence of the second series of impulses the stud 8 co-operates with the stud 6 in substantially the same manner as it co-operated with the stud 5, previously described, thereby maintaining the operating-bar f in front of or below the arm e^4, and so on.

A plate w (see Figs. 2 and 5) is mounted on a stud w', having an arm or projection w^2, which is acted upon by a pin w^3, secured to the winding-arm a^{12}, when the latter is moved in the direction of the arrow thereon to wind the train. The plate w is acted upon by a spiral spring w^4 (see dotted lines, Fig. 5, and full lines, Fig. 2) to turn it in the opposite direction. When the winding-arm a^{12} is moved to wind the train and the indicating devices, the plate w is turned from the dotted to the full-line position, Fig. 5, throwing the said plate against and in front of the armature f^3 of the electro-magnet f^4, returning said armature near to but not completely restoring it to its normal position. The plate w is held in this position by the friction of the armature f^3 bearing against it. As soon as the armature is pulled up by the attraction of the electro-magnet the spring w^4 throws the plate w back into the dotted-line position shown in Fig. 5.

Many of the parts herein shown and described are applicable to the indicator shown and described in the application above referred to, and so also many of the parts shown in that application may be applied to the indicator herein shown; also other well-known substitutes and equivalents may be employed without departing from the spirit and scope of this invention.

Referring to Fig. 6, the plate f^6 has the stepped portion i formed on it directly, said plate guiding the operating-bar f, and the operating-bar is connected to a plate u, pivoted at u' and normally held against a pin u^2 by a spring u^3. The plate u has a projection u^4, which is engaged by an arm u^5, attached to the armature-carrying lever f^2 of the electro-magnet f^4. (Not shown.) The plate f^6 is pivoted at u^6 frictionally to a rotating shaft of the time-train. A projection u^7 is formed on the plate u, which, as the said plate is turned on its pivot u', strikes one or another step of the plate i, moving the plate f^6 back at each successive impulse, unless the impulse is followed by a period of rest of sufficient duration to permit the time-train to bring the next step into position to be struck by the projection u^7.

Referring to Fig. 7, the plate f^6 guides the bar f, connected to the armature-carrying lever, and said plate f^6 carries a stud i^3, which co-operates with a stepped plate i, arranged on a shaft i^2. The plate i has a stepped or toothed portion o, with which co-operates a bar o^{10}, also connected to the armature-carrying lever, so that as the armature is moved back and forth the arm o^{10} will strike one or another tooth of the stepped portion o.

In both Figs. 6 and 7 the same results as heretofore set forth may be easily and efficiently carried out.

We claim—

1. In an electric indicator, the combination of the following instrumentalities: two sets of movable frames arranged in parallelism, a series of tapes having characters thereon connected to said movable frames, actuating-springs connected to each frame of one set, let-offs co-operating with each frame of the other set, whereby said frames may be moved intermittingly and independently and different combinations of characters presented on the substantially plane surface of the several tapes between the frames, a vibrating and laterally-movable operating-lever for said let-offs, and an electro-magnet controlling its vi-

bratory movement and a motor mechanism controlling its lateral movement, substantially as described.

2. In an electric indicator, the combination of the following instrumentalities: two sets of movable frames arranged in parallelism, a series of tapes having characters thereon connected to said movable frame, actuating-springs connected with each frame of one set, let-offs for the frames, whereby they may be moved by the actuating-springs intermittingly and independently to present different combinations of characters on the substantially plane surface of the several tapes between the frames, restoring devices connected with the other set of movable frames, a vibratory and laterally-movable operating-lever for said let-offs, and an electro-magnet controlling its vibratory movement and a motor mechanism controlling its lateral movement, substantially as described.

3. In an electric indicator, a series of parallel tapes, characters thereon, and let-offs for said tapes, combined with an electro-magnet, its armature, an operating-bar for the let-offs actuated longitudinally by the armature, and a stepped plate frictionally connected with a time-train and controlling the transverse vibrations of said operating-bar, substantially as described.

4. In an electric indicator, a series of parallel tapes and let-offs for them, an electro-magnet, its armature, and an operating-bar pivoted to said armature and moved toward and from the let-offs by the electro-magnet, combined with a carrier, a guide thereon through which said operating-bar is moved, means for moving the carrier, and a stepped plate controlling the position of said carrier and continuously in contact therewith, substantially as described.

5. In an electric indicator, a series of tapes, let-offs therefor, an electro-magnet, its armature, and an operating-bar pivoted to said armature and moved toward and from the let-offs by the electro-magnet, combined with a carrier, a guide thereon for said operating-bar, a stepped plate to control the position of the carrier, frictionally connected to and moved in one direction by a time-train, and means to keep the carrier continuously in contact with said stepped plate, substantially as described.

6. In an electric indicator, a series of tapes, let-offs therefor, an electro-magnet, its armature, and an operating-bar for the let-offs, longitudinal movement of which is controlled by the armature, combined with a carrier, a stepped plate for determining the position of the carrier and frictionally connected to and moved in one direction by a time-train, a series of beveled studs on a portion of said plate, an arm carried by the armature to cooperate with said studs to move the plate backward or opposite to the direction given it by the time-train, and means to keep the carrier in contact with said plate, as and for the purposes described.

7. In an electric indicator, winding mechanism, combined with an electro-magnet, its armature, and an armature-restoring plate, a spring to retain said plate out of contact with the armature, and a projection on said plate in the path of movement of a member of the winding mechanism, the winding thereof moving said plate against its spring into contact with the armature to move the same near the poles of the magnet, the armature and the plate remaining in contact until the armature is moved by the magnet, substantially as described.

8. In an electric indicator, a series of figured tapes supported on movable frames and let-offs therefor, combined with an operating-bar for the let-offs, its carrier, a stepped plate in contact with the carrier, a part of said plate having thereon a series of studs beveled in opposite directions, the plate being frictionally connected to and moved in one direction by the motor, a detent for said motor, an electro-magnet, its armature and arm secured thereto, having a stud 8 to contact with one or another of said studs on the stepped plate, the operating-bar and armature, contact of the studs moving the stepped plate back against the action of the motor, and a lever intermediate the detent and armature, retraction of the armature releasing the motor, substantially as described.

9. In an electric indicator, a series of indicating-drums and let-offs therefor, whereby they may be moved intermittingly and independently, combined with an operating-lever for said let-offs, a stepped plate for holding said operating-lever in its different positions, an electro-magnet and its armature controlling the longitudinal movement of said operating-lever, a time-train controlling the lateral movement of said operating-lever, and means for setting the stepped plate back, which is disengaged from said stepped plate at each limit of motion of the armature, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

MOSES G. CRANE.
FREDERICK W. COLE.

Witnesses:
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EMMA J. BENNETT,